FORMULARIO DE ESTADÍSTICA I

ESTADÍSTICA DESCRIPTIVA

$$\sigma^2 = \frac{x_1^2 + x_2^2 + \ldots + x_N}{N} - \mu^2$$

$$MDA = \frac{|x_1 - \mu| + |x_2 - \mu| + \ldots + |x_N - \mu|}{N}$$

$$s^2 = \frac{\left(x_1^2 + x_2^2 + \ldots + x_n^2\right) - n\overline{x^2}}{n-1}$$

$$MDA = \frac{|x_1 - \overline{x}| + |x_2 - \overline{x}| + \ldots + |x_n - \overline{x}|}{n}$$

$Re = x_n - x_1$

$Ri = C_3 - C_1$

$$\sigma^2 = \frac{\sum_{i=1}^{k} f_i (m_i - \mu)^2}{N}$$

$$Me = lím.\inf.R_i + \frac{\frac{N}{2} - F_{i-1}}{f_i} h_i$$

$$s^2 = \frac{\sum_{i=1}^{k} f_i \left(m_i - \overline{x}\right)^2}{n-1}$$

$$Me = L + \left(j - \frac{1}{2}\right)\left(\frac{U-L}{f}\right)$$

$$CV = \frac{\sigma}{\overline{x}} 100$$

$$Mo = lím.\inf.R_j + \frac{f_{j+1}}{f_{j+1} + f_{j-1}} h_j$$

$$A = \frac{(C_3 - C_2) - (C_2 - C_1)}{C_3 - C_1}$$

$$P_k = lím.\inf.R_i + \frac{\frac{KN}{100} - F_{i-1}}{f_i} h_i$$

$$A_s = \frac{\overline{x} - M_o}{\sigma}$$

NÚMEROS ÍNDICE

$$I_0^T = \frac{x_{it}}{x_{i0}} 100$$

$$\overline{I} = \frac{I_1 + I_2 + \ldots + I_N}{N}$$

$$I^* = \frac{I_1 W_1 + I_2 W_2 + \ldots + I_N W_N}{W_1 + W_2 + \ldots + W_N}$$

$$I_G = \sqrt[N]{I_1 I_2 \ldots I_N}$$

$$I_G^* = \sqrt[\sum W_i]{I_1^{W_1} I_2^{W_2} \ldots I_N^{W_N}}$$

$$I_A = \frac{x_{1t} + x_{2t} + \ldots + x_{Nt}}{x_{10} + x_{20} + \ldots + x_{N0}}$$

$$I_A^{*} = \frac{x_{1t} w_1 + x_{2t} w_2 + \ldots + x_{Nt} w_N}{x_{10} w_1 + x_{20} w_2 + \ldots + x_{N0} W_N}$$

Laspeyres: $L_P = \frac{\sum p_{IT} q_{I0}}{\sum p_{I0} q_{I0}}$

$L_q = \frac{\sum p_{I0} q_{IT}}{\sum p_{I0} q_{I0}}$

Paasche: $P_P = \frac{\sum p_{IT} q_{IT}}{\sum p_{I0} q_{IT}}$

$P_q = \frac{\sum p_{IT} q_{IT}}{\sum p_{IT} q_{I0}}$

Factor de conversión: $\frac{I_K}{100}$

PROBABILIDAD

$$C_n^r = \frac{n!}{r!(n-r)!} \qquad V_n^r = \frac{n!}{(n-r)!} \qquad P_n = n!$$

$$CR_n^r = C_{n+r-1}^r = \frac{(n+r-1)!}{r!(n-1)!} \qquad VR_n^r = n^r \qquad P_n^{r_1, r_2, \ldots, r_k} = \frac{n!}{r_1! r_2! \ldots r_k!}$$

$$P\left(A/B\right) = \frac{P(A \cap B)}{P(B)} \qquad P(A \cap B) = P\left(A/B\right)P(B)$$

$$P\left(B/A\right) = \frac{P\left(A/B\right)P(B)}{P(A)} \qquad P\left(E_i/R\right) = \frac{P(E_i)P\left(R/E_i\right)}{P(E_1)P\left(R/E_1\right) + \ldots + P(E_n)P\left(R/E_n\right)}$$

$$E(x) = \mu_x = x_1 p_1 + x_2 p_2 + \ldots + x_n p_n$$ $= \sum = x \cdot p(x)$

$$\sigma_x^2 = E\left[(x-\mu_x)^2\right] = \sum_x (x_i - \mu_x)^2 P(x_i)$$

$$\underline{\sigma_x^2 = E(x^2) - \mu_x^2 = \sum_x x_i^2 P(x_i) - \mu_x^2}$$ $-(E(x))^2$

$$\sigma_x = +\sqrt{\sigma_x^2}$$

$$E(xy) = \sum x_i y_j P\left[x = x_i ; y = y_j\right]$$

$$E\left(x/y\right) = \sum x_i P\left(x_i/y_j\right) = x_1 P\left(x = x_1/y\right) + x_2 P\left(x_2/y\right) + \ldots$$

$$Cov(x,y) = E\left[(x-\mu_x)(y-\mu_y)\right] = \sum\sum (x_i - \mu_x)(y_j - \mu_y) f(x_i, y_j)$$

$$Cov(x, y) = E(xy) - E(x)E(y)$$

DISTRIBUCIONES DE PROBABILIDAD

Distribución de Bernouilli:

$$E(x) = \mu_x = P$$
$$\sigma_x^2 = P(1-P)$$

Distribución Binomial:

$$P(x = k) = C_k^n P^k q^{n-k} \qquad q=1-P$$

E(x)=np

Var(x)=npq

Distribución Hipergeométrica:

$$P(x = k) = \frac{C_M^x C_{N-M}^{n-x}}{C_N^n} \qquad P(X=x) = \frac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}}$$

$$P(x = k) = \frac{C_K^R C_{n-k}^{N-R}}{C_n^N}$$

$$N \begin{cases} \nearrow M \\ \searrow N-M \end{cases} \qquad n \begin{cases} \nearrow x \\ \searrow n-x \end{cases}$$

E(x)=np

↓ proporción de éxito

$$\sigma_x^2 = \left(\frac{N-n}{N-1}\right) np(1-p)$$

↓ varianza

Distribución de Poisson:

$$P(x = k) = \frac{e^{-\lambda}\lambda^k}{k!}$$

E(x)=λ

Var(x)= λ

$$X \longrightarrow B(n, p)$$

$\downarrow$ Si: n>20, p<0´05

$$X \longrightarrow P(\lambda = np) = \frac{e^{-\lambda}\lambda^k}{k!}$$

$$E(x) = \int_{-\infty}^{+\infty} x \cdot f(x)dx \qquad g(x) = \int_{-\infty}^{+\infty} f(x, y)dy$$

$$Var(x) = E\left[(x - \mu_x)^2\right] \qquad g(y) = \int_{-\infty}^{+\infty} f(x, y)dx$$

$$Var(x) = E(x^2) - [E(x)]^2 \qquad E(x^2) = \int_{-\infty}^{+\infty} x^2 \cdot f(x)dx$$

$$Cov(x, y) = E[(x - \mu_x)(y - \mu_y)]$$

$$Cov(x, y) = E(xy) - \mu_x \mu_y$$

Distribución normal:

v.a.x $\rightarrow$ N (μ, σ)

$$f(x)=\frac{1}{\sqrt{2\pi}\sigma}e^{\frac{-1}{2}\left(\frac{x-\mu}{\sigma^2}\right)^2} \qquad -\infty < x < +\infty$$

$$F(x)=\int_{-\infty}^{x}\frac{1}{\sqrt{2\pi}\sigma}e^{\frac{-1}{2}\left(\frac{x-\mu}{\sigma^2}\right)^2}dx$$

$E(x)=\mu_x$

$Var(x)=\sigma^2_x$

v.a.z $\rightarrow$ N (0, 1)

$$f(z)=\frac{1}{\sqrt{2\pi}}e^{\frac{-1}{2}z^2} \qquad -\infty < z < +\infty$$

$$F(z)=P[z\le z_i]=\int_{-\infty}^{z_i}\frac{1}{\sqrt{2\pi}}e^{\frac{-1}{2}u^2}du$$

$$E(z)=\mu_z=\int_{-\infty}^{+\infty}z\cdot f(z)dz=0$$

$$\sigma_z^2=1$$

Distribución Exponencial:

$$f_x(x)=\frac{e^{-x/\mu}}{\mu} \qquad x\ge 0$$

$$F_x(x)=1-e^{-x/\mu} \qquad x\ge 0$$

Aproximaciones:

$$\begin{tikzcd}
\text{v.a.x} \arrow[r] \arrow[d] \arrow[dr, phantom, "\begin{matrix}\text{Si: } np\ge 5\\ n(1-p)\ge 5\end{matrix}"] & B\ (n,p) \\
z \arrow[r] & N\ (0,1)
\end{tikzcd}$$

$$z=\frac{(x-np)\pm 1/2\ u.m.}{\sqrt{np(1-p)}}$$

$$\begin{array}{ccc} \text{v.a.x} & \longrightarrow & H(M,N,n) \\ \Big\downarrow & & \text{Si: } np \geq 5 \\ & & n(1-p) \geq 5 \\ z & \longrightarrow & N(0,1) \end{array}$$

$$z = \frac{(x-np) \pm \frac{1}{2}\,u.m.}{\sqrt{np(1-p)}\sqrt{\frac{N-n}{N-1}}}$$

$\downarrow$

No si n < 0´05N

$$\begin{array}{ccc} \text{v.a.x} & \longrightarrow & P(\lambda) \\ \Big\downarrow & & \text{Si: } \mu=\lambda > 5 \\ z & \longrightarrow & N(0,1) \end{array}$$

$$z = \frac{(x-\lambda) \pm \frac{1}{2}\,u.m.}{\sqrt{\lambda}}$$

DISTRIBUCIONES MUESTRALES

$$\left\{ \begin{array}{l} \bar{x} \rightarrow N\left(\mu_x; \dfrac{\sigma_x}{\sqrt{n}}\right) \\ \dfrac{\bar{x}-\mu_x}{\sigma_x/\sqrt{n}} = z \end{array} \right.$$ *

$$\left\{ \begin{array}{l} \bar{x} \rightarrow N\left(\mu_x; \dfrac{\sigma_x}{\sqrt{n}}\sqrt{\dfrac{N-n}{N-1}}\right) \\ \dfrac{\bar{x}-\mu_x}{\dfrac{\sigma_x}{\sqrt{n}}\sqrt{\dfrac{N-n}{N-1}}} = z \end{array} \right.$$ *

$$\left\{ \begin{array}{l} \bar{x} \rightarrow N\left(\mu_x; \dfrac{s_x}{\sqrt{n}}\right) \\ \dfrac{\bar{x}-\mu_x}{s_x/\sqrt{n}} = t_{(n-1)} \end{array} \right.$$ *

$$\begin{cases} \bar{x} \rightarrow N\left(\mu_x ; \dfrac{s_x}{\sqrt{n}} \sqrt{1-\dfrac{n}{N}} \right) \\[2ex] \dfrac{\bar{x}-\mu_x}{\dfrac{s_x}{\sqrt{n}}\sqrt{1-\dfrac{n}{N}}} = t_{(n-1)} \end{cases}$$

$$\left(\dfrac{(n-1)s^2{}_x}{\sigma_x^2} = \chi^2_{(n-1)} \right.$$

$$\begin{cases} \left(\bar{x}-\bar{y}\right) \rightarrow N\left(\mu_x - \mu_y ; \sqrt{\dfrac{\sigma_x^2}{n_x}+\dfrac{\sigma_y^2}{n_y}} \right) \\[2ex] \dfrac{\left(\bar{x}-\bar{y}\right)-\left(\mu_x-\mu_y\right)}{\sqrt{\dfrac{\sigma_x^2}{n_x}+\dfrac{\sigma_y^2}{n_y}}} = z \end{cases}$$

$$\begin{cases} \left(\bar{x}-\bar{y}\right) \rightarrow N\left(\mu_x - \mu_y ; \sigma\sqrt{\dfrac{1}{n_x}+\dfrac{1}{n_y}} \right) \\[2ex] \dfrac{\left(\bar{x}-\bar{y}\right)-\left(\mu_x-\mu_y\right)}{\sigma\sqrt{\dfrac{1}{n_x}+\dfrac{1}{n_y}}} = z \end{cases}$$

$$\begin{cases} \dfrac{\left(\bar{x}-\bar{y}\right)-\left(\mu_x-\mu_y\right)}{s_p\sqrt{\dfrac{1}{n_x}+\dfrac{1}{n_y}}} = t_{n_x+n_y-2} \\[2ex] s_p^2 = \dfrac{(n_x-1)s_x^2+(n_y-1)s_y^2}{n_x+n_y-2} \end{cases}$$

$$\begin{cases} \dfrac{\left(\bar{x}-\bar{y}\right)-\left(\mu_x-\mu_y\right)}{\sqrt{\dfrac{s_x^2}{n_x}+\dfrac{s_y^2}{n_y}}} = t_k \\[2ex] k = \dfrac{(n_x-1)(n_y-1)}{(n_y-1)c^2+(1-c)^2(n_x-1)} \\[2ex] c = \dfrac{s_x^2/n_x}{s_x^2/n_x + s_y^2/n_y} \end{cases}$$

$$\left(\frac{\bar{d}-(\mu_x-\mu_y)}{s_d/\sqrt{n}}=t_{n-1}\right.$$

$$\left\{\begin{array}{l}\hat{P}_x \to N\left(\hat{P}_x, \sqrt{\dfrac{\hat{P}_x(1-\hat{P})}{n}}\right) \\[2ex] \dfrac{\hat{P}_x-P}{\sqrt{\dfrac{\hat{P}_x(1-\hat{P}_x)}{n}}}=z\end{array}\right.$$

D.P.M

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$$\left\{\begin{array}{l}(\hat{P}_x-\hat{P}_y) \to N\left(\begin{array}{l}P_x-P_y; \\ \dfrac{\hat{P}_x(1-\hat{P}_x)}{n_x}+\dfrac{\hat{P}_y(1-\hat{P}_y)}{n_y}\end{array}\right) \\[2ex] \dfrac{(\hat{P}_x-\hat{P}_y)-(P_x-P_y)}{\sqrt{\dfrac{\hat{P}_x(1-\hat{P}_x)}{n_x}+\dfrac{\hat{P}_y(1-\hat{P}_y)}{n_y}}}=z\end{array}\right.$$